



Massachusetts Department of Environmental Protection Source Water Assessment and Protection (SWAP) Report For Linden Hill School

What is SWAP?

The Source Water Assessment and Protection (SWAP) program, established under the federal Safe Drinking Water Act, requires every state to:

- Inventory land uses within the recharge areas of all public water supply sources;
- Assess the susceptibility of drinking water sources to contamination from these land uses; and
- Publicize the results to provide support for improved protection.

SWAP and Water Quality

Susceptibility of a drinking water source does *not* imply poor water quality. Actual water quality is best reflected by the results of regular water tests.

Water suppliers protect drinking water by monitoring for more than 100 chemicals, treating water supplies, and using source protection measures to ensure that safe water is delivered to the tap.

Prepared by the
Massachusetts Department of
Environmental Protection,
Bureau of Resource Protection,
Drinking Water Program

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Table 1: Public Water System (PWS) Information

<i>PWS Name</i>	Linden Hill School
<i>PWS Address</i>	154 South Mountain Road
<i>City/Town</i>	Northfield, Massachusetts
<i>PWS ID Number</i>	1217006
<i>Local Contact</i>	Mr. John Sullivan
<i>Phone Number</i>	413-238-5344

<i>Source Name</i>	<i>Source ID#</i>	<i>Zone I (in feet)</i>	<i>IWPA (in feet)</i>	<i>Source Susceptibility</i>
Well #4	1217006-04G	250	622	Moderate

Introduction

We are all concerned about the quality of the water we drink. Drinking water supplies may be threatened by many potential sources of contamination, including septic systems, road deicing, and improper disposal of hazardous materials. Citizens and local officials can work together to better protect these drinking water sources.

Purpose of this report:

This report is a planning tool to support local and state efforts to improve water supply protection. By identifying land uses within water supply protection areas that may be potential sources of contamination, the assessment helps focus protection efforts on appropriate best management practices (BMPs) and drinking water source protection measures. Department of Environmental Protection (DEP) staff are available to provide information about funding and other resources that may be available to your community.

This report includes:

1. Description of the Water System
2. Discussion of Land Uses within Protection Areas
3. Recommendations for Protection
4. Attachments, including a Map of the Protection Areas

1. Description of the Water System

Linden Hill School is located on South Mountain Road in the town of Northfield in northwestern Massachusetts on the Vermont and New Hampshire border. The facility is a residential school for boys, ages 9 to 15 with special educational needs; the summer program includes boys and girls ages 7 to 16. Northfield is a small rural residential community that has public water and sewer, however those services are not available in the area where the school is located. The facility is therefore served by a single on-site water supply well and wastewater is discharge to a common septic system.

What is a Protection Area?

A well's water supply protection area is the land around the well where protection activities should be focused. Each well has a Zone I protective radius and an Interim Wellhead Protection Area (IWPA).

- **The Zone I** is the area that should be owned or controlled by the water supplier and limited to water supply activities.
- **The IWPA** is the larger area that is likely to contribute water to the well.

In many instances the IWPA does not include the entire land area that could contribute water to the well. Therefore, the well may be susceptible to contamination from activities outside of the IWPA that are not identified in this report.

What is Susceptibility?

Susceptibility is a measure of a well's potential to become contaminated due to land uses and activities within the Zone I and Interim Wellhead Protection Area (IWPA).

The school population fluctuates but has the capacity for approximately 100 staff and students. The school grounds include approximately six buildings including a gymnasium, dorms and classrooms. The school recently added a new dormitory.

Water is supplied by a single source, Well #4 that is located on the side of the hill east of the Headmaster's house. Well #4 was approved in November 2003 to replace Wells #1, #2 and #3 which are non-conforming with respect to DEP Zone I restrictions and are located in the center of the campus adjacent to buildings. Wells #1, #2 and #3 have currently been designated as emergency sources and will not be further addressed in this report. Well #4 is a 6-inch diameter, 520 feet deep well drilled into the bedrock aquifer. The well has 50 feet of casing grouted 31 feet into the rock.

The Zone I is the area immediately around the wellhead while the Interim Wellhead Protection Area (IWPA) is a larger area that likely contributes water to the wellhead. The IWPA is only an interim protection area; the actual area of contribution to the wells may be smaller or much larger than the IWPA. The Zone I and IWPA radii for Well #4 are 250 feet and 622 feet, respectively, based on a withdrawal rate approved as a result of the New Source Approval Process. Please refer to the attached map that shows the Zone I and IWPA radii.

The complex is located in an area where the geologic mapping indicates thin till overburden covering the bedrock. The well logs confirm approximately 19 feet of overburden at the well site. The bedrock at the site is mapped as gneiss associated with the Bronson Hill Zone. There is no evidence of an extensive protective till or clay layer in the vicinity of the wells. Wells drilled in these conditions are considered highly vulnerable to potential contamination from the ground surface because there is no significant hydrogeologic barrier, such as clay, to prevent surface contamination from migrating into the bedrock aquifer.

The facility's well water is not treated. Public water suppliers are required to monitor water quality at the facility. For current information on monitoring results, please review the Consumer Confidence report (CCR) that is issued annually by the water supplier or refer questions to the water supply contact listed above in Table 1.

2. Discussion of Land Uses in the Protection Areas

Table 2: Table of Activities within the Water Supply Protection Areas

Potential Contaminant Sources	Zone I	IWPA	Threat	Comments
Transportation corridors/parking	No	Yes	Moderate	Manage stormwater and limit road salt usage.
Above ground storage tank (fuel oil)	No	Yes	Moderate	Use BMPs for fuel oil storage and delivery
High density/low density residential	No	Yes	Moderate	Provide BMPs for household hazardous waste management. Use IPM for lawn maintenance.
Septic system components	No	Yes	Moderate	Leachfield is located outside of the protection areas. Some components are within the Zone I and IWPA.
School	No	Yes	Moderate	Use BMPs for household hazardous materials

* -For more information on Contaminants of Concern associated with individual facility types and land uses please see the SWAP Draft Land Use / Associated Contaminants Matrix on DEP's website - www.state.ma.us/dep/brp/dws/.

Glossary

Zone I: The area closest to a well; a 100 to 400 foot radius proportional to the well's pumping rate. To determine your Zone I radius, refer to the attached map.

IWPA: A 400-foot to ½ mile radius around a public water supply well proportional to its pumping rate; the area DEP recommends for protection in the absence of a defined Zone I. To determine IWPA radius, refer to the attached map.

Zone II: The primary recharge area defined by a hydrogeologic study.

Aquifer: An underground water-bearing layer of permeable material that will yield water in a usable quantity to a well.

Hydrogeologic Barrier: An underground layer of impermeable material that resists penetration by water.

Recharge Area: The surface area that contributes water to a well.

There are land uses and activities within the drinking water supply protection areas that are potential sources of contamination.

Key issues include:

1. **Institution use (residential school);**
2. **Transportation corridors/parking.**

The overall ranking of susceptibility to contamination for the well is moderate, based on the presence of several moderate threat land use or activity in the IWPA, as seen in Table 2. However, the well is located topographically upgradient of the school and the well is fairly remote from activities at the school. A few moderate threat activities are located on the downgradient portion of the IWPA. The system is in compliance with the Zone I restrictions that allow only water supply related or non-threatening activities in the Zone I for the Well 04G.

1. Institutional use – The school consists of land uses that are common to residential uses. The facility utilizes a single on-site septic disposal system; the leachfield is outside of the IWPA although some components are within the IWPA. One private home is located within the IWPA. The school utilizes fuel oil for heating and the storage tanks are located in the buildings. Only the headmaster's house is within the IWPA. If managed improperly, activities associated with residential areas can contribute to drinking water contamination. The septic system is predominantly outside of the protection areas although some components are within the downgradient edge of the IPWA. Common potential sources of contamination include:

- **Septic Systems** – Improper disposal of household hazardous chemicals to septic systems is a potential source of contamination to the groundwater because septic systems lead to the ground. If septic systems fail or are not properly maintained, they could be a potential source of microbial contamination.
- **Household Hazardous Materials** - Hazardous materials may include automotive wastes, paints, solvents, pesticides, fertilizers, and other substances. Improper use, storage, and disposal of chemical products used in homes are potential sources of contamination.
- **Heating Oil/Kerosene Storage** - If managed improperly, Underground and Aboveground Storage Tanks (USTs and ASTs) and their piping can be potential sources of contamination due to leaks or spills of the fuel oil/kerosene they store.
- **Stormwater** – Catch basins transport stormwater from roadways and adjacent

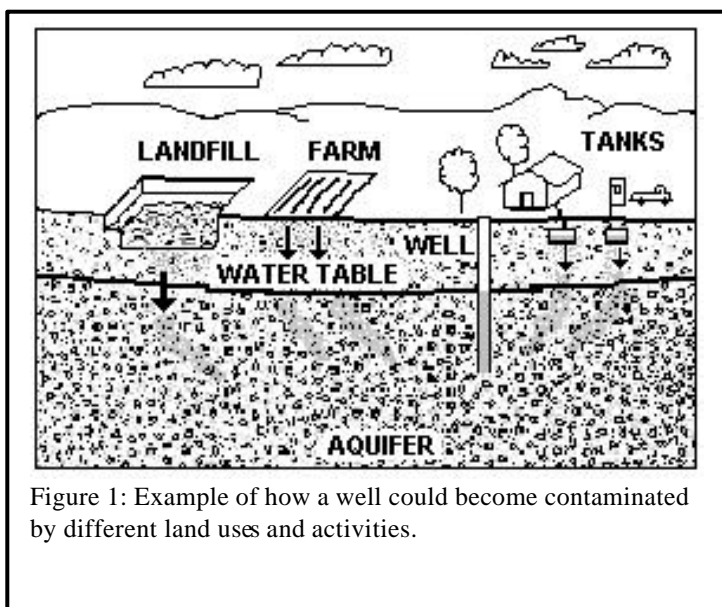


Figure 1: Example of how a well could become contaminated by different land uses and activities.

properties to the ground. As flowing stormwater travels, it picks up debris and contaminants from streets and lawns. Common potential contaminants include lawn chemicals, pet waste, and contaminants from automotive leaks, maintenance, washing, or accidents.

Residential Land Use Recommendations:

- ✓ Educate residents on best management practices (BMPs) for protecting water supplies. Distribute the fact sheet "Residents Protect Drinking Water" attached to this report and at the DEP website www.mass.gov/dep/brp/dws/protect.htm, which provides BMPs for common residential issues.
- ✓ Promote BMPs for stormwater management and pollution controls. Provide containment for the tanks and sleeve the fuel lines.
- ✓ The facility utilizes fuel oil for a heating source. Containment of the fuel system to prevent accidental releases to the basements and ground should be reviewed in the buildings. Fuel tanks should be within containment

For More Information:

Contact Catherine Skiba in DEP's Springfield Office at (413) 755-2119 for more information and for assistance in improving current protection measures.

More information relating to drinking water and source protection is available on the Drinking Water Program web site at:

www.state.ma.us/dep/brp/dws/

Additional Documents:

To help with source protection efforts, more information is available by request or online at www.state.ma.us/dep/brp/dws/ including:

1. Water Supply Protection Guidance Materials such as model regulations, Best Management Practice information, and general water supply protection information.
2. MA DEP SWAP Strategy
3. Land Use Pollution Potential Matrix
4. Draft Land/Associated Contaminants Matrix

Copies of this assessment have been made available to the public water supplier and town boards.

to protect floor drains, cracked floors or walls that could act as conduits if fuel oil leaks or is spilled from the storage tanks. Contact the regional DEP staff from the UIC program (Tony Zaharias 413-755-2122 or Rick Larson 413-2207) for advice regarding protecting tanks. Oil lines from the tank to the boiler should be sleeved so that any leaks would drain back to the tank or minimal oil would leak to the room. Prepare a policy and a plan for maintenance operations, especially when oil filters are changed. DEP recommends that you require your boiler maintenance contractor use containment, protect any drains and have absorbent materials on hand to prevent accidental leaks while conducting routine maintenance. The contractor should be responsible for the off-site disposal of any boiler blow down generated during maintenance.

- ✓ Seal all cracks in the floor and any floor drains if they cannot be adequately protected to prevent a prohibited discharge.

2. Transportation corridor/parking – The school's internal corridors and South Mountain Road are within the IWPA. Accidents and normal use and maintenance of corridors and parking areas may pose a potential threat to water quality. Catch basins transport stormwater from roadways and adjacent properties to the ground, streams, rivers or reservoir. As flowing stormwater travels, it picks up de-icing materials, petroleum chemicals and other debris on roads and contaminants from streets and lawns. Common potential contaminants in stormwater originate from automotive leaks, automobile maintenance and car washing, accidental spills, as well as, waste from wildlife and pets.

Recommendations:

- ✓ Prepare an Emergency Response Plan that includes coordination among town emergency responders to be sure they are aware of the location of your well and the protection areas.

Implementing the following recommendations will reduce the system's susceptibility to contamination.

3. Protection Recommendations

Implementing protection measures and best management practices (BMPs) will reduce the well's susceptibility to contamination. Linden Hill is commended for replacement of the threatened wells. Review and adopt the key recommendations above and the following:

Zone I:

- ✓ Keep non-water supply activities out of the Zone I.
- ✓ Conduct regular inspections of the Zone I.

Facilities Management:

- ✓ For utility transformers that may contain PCBs, contact the utility to determine if PCBs have been replaced. If PCBs are present, urge their immediate replacement. Keep the area near the transformer free of tree limbs that could endanger the transformer in a storm.
- ✓ Continue to educate the staff and control the use of household hazardous materials

in the Zone I.

- ✓ Continue to minimize the use of fertilizers and pesticides on campus.
- ✓ Monitor fuel oil delivery and use to prevent releases.

Planning:

- ✓ Work with your community to include your IWPA in the District along with other public water supplies in town.

- ✓ Have a plan to address short-term water shortages and long-term water demands. Keep the phone number of a bottled water company readily available.
- ✓ Continue long term planning for the system that includes maintenance of the water and wastewater systems.

Funding:

The Department's Wellhead Protection Grant Program provides funds to assist public water suppliers in addressing Wellhead protection through local projects. Protection recommendations discussed in this document may be eligible for funding under the "Wellhead Protection Grant Program". For additional information, please refer to the attached program fact sheet. Each program year, if funds are available, the Department posts a new Request for Response for the Grant program (RFR). Other funding opportunities are described in "Grant and Loan Programs: Opportunities for Watershed Protection, Planning and Implementation" at: <http://www.state.ma.us/dep/brp/mf/files/glprgm.pdf>.

These recommendations are only part of your ongoing local drinking water source protection. Citizens and community officials should use this SWAP report to encourage discussion of local drinking water protection measures.

4. Attachments

- Map of the Public Water Supply (PWS) Protection Areas
- Recommended Source Protection Measures Fact Sheet